

Original article

## Transepithelial Photorefractive Keratectomy for High-Grade Myopia: Tripoli-Libya

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Transepithelial photorefractive keratectomy (TransPRK), Myopia.

**ABSTRACT**

Refractive errors, such as myopia and astigmatism, have become more prevalent in recent years. The study aimed to investigate the clinical outcomes of transepithelial photorefractive keratectomy (Trans-PRK) for the correction of high myopia. A retrospective cohort study design has been established. The study group included 83 eyes with high-grade myopia ( $-6.0$  diopters or higher) that had been treated by a single surgeon with Trans-PRK from 2019 to 2020 in Alqabas Eye Center, Tripoli, Libya. The mean age of patients was 32.1 years; mostly belonged to the female (76%). At 12 months follow-up, 90.4% of eyes achieved  $\pm 0.25 \pm 1.00$  D target refraction. Trans-PRK may offer an effective treatment for high myopia. A longer follow-up is recommended.

**Introduction**

Myopia, is the most common refractive error of the eye, and is still the main cause of visual impairment throughout the world. According to the American Academy of Ophthalmology, Myopia has been divided into mild, moderate, and high, the latter which is above 6.0 diopters (D). The presence of high-grade myopia is one of the leading reasons for not performing refractive surgery<sup>1,2</sup>. Surgical correction of spherical and cylindrical refractive errors has led to a decrease in complications as the improvement of recent technology. Accurate correction, especially high myopia is crucial to achieve better refractive outcomes. However, treatment of high myopia is still a challenge. Transepithelial photorefractive keratectomy (TransPRK) is popularly chosen as one step procedure for correcting myopia. Moreover, compared with other procedures, surface ablation retained more corneal stromal tissue, thus avoiding the potential risk of keratectasia<sup>3</sup>.

Several studies have evaluated the refractive and visual outcomes after TransPRK<sup>4-7</sup>. Others, have shown that TPRK, PRK or LASEK are efficient and safe methods to correct low and moderate myopia<sup>8,9</sup>. However, for high myopia, the stability and predictability of correction may be reduced.

Larger stromal ablation is required causing more extensive wound healing<sup>10,11</sup>

Correction of high myopia remains a difficult challenge for surface ablation, Furthermore, whether surface ablation provides the better outcome remains inconclusive. However, In this study we will focus on the efficacy and clinical outcomes of correcting high myopia by TransPRK. To evaluate the clinical (refractive and visual) outcomes for those who undergo Transepithelial photorefractive keratectomy (TransPRK) in the treatment of high grades myopia.

**Methods**

The retrospective study comprises 83 eyes with high myopia ( Spherical equivalent equal to  $-6$  D and more) who received TransPRK between 2019 to 2020 at Alqabas eye center, Tripoli, Libya. All patients underwent a complete ophthalmic examination and had no ocular diseases except myopia and astigmatism.

Preoperative examinations included slit-lamp biomicroscopy, uncorrected distance visual acuity (UDVA), corrected distance visual acuity (CDVA), corneal topography (pentacam scheimpflug topography "Oculus, Germany" ), manifest refraction, cycloplegic refraction and dilated funduscopy examination. Patients with suspicion of keratoconus or who loss one year follow-up has been be excluded. Data were analyzed using Excel and SPSS version 15.0.

**Surgical technique<sup>12</sup>**

The surgery was performed by a single surgeon using the SCHWIND Amaris 500E excimer laser platform (SCHWIND eye-tech-solutions GmbH, Kleinostheim, Germany). Ablations were based on aberration-free algorithms calculated using ORK-CAM software.

The ablation profile targets epithelial thickness as 55  $\mu\text{m}$  centrally and 65  $\mu\text{m}$  peripherally according to the population model statistics. Before ablation, all patients examinations will be tested by the cyclotorsion control (both static and dynamic) which will be used through the surgery. After ablation, Mitomycin C(MMC 0.02%) will immediately applied for 50 s using a damp Merocel sponge, then the corneal stroma will copiously irrigated with a cool balanced salt solution and then a soft bandage contact lens will be applied.

After surgery, the patients will be treated with topical levofloxacin eye drops four times a day for one week, Maxidex eye drops four to six times daily (tapered over 6 weeks) and preservative-free artificial tears eight times daily for the first two weeks then four times for at least 2 months. The contact lens will be removed once the epithelial closure is complete.

**Results**

A total number of 83 high myopic eyes from 50 patients were included in this study. All of the patients completed one-year follow-up. The mean age of patients was 32.1yr and the mode age was 23yr ; (Figure.1) , with a range of 20-52y; 38 (76%) eyes belonged to female and 12 (24%) eyes belonged to male patients . (Table.1) and (Figure.2)

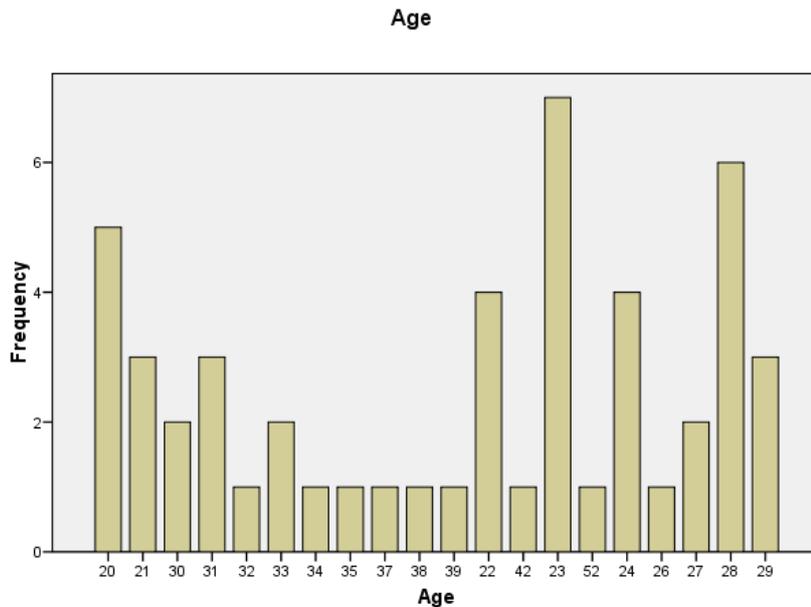
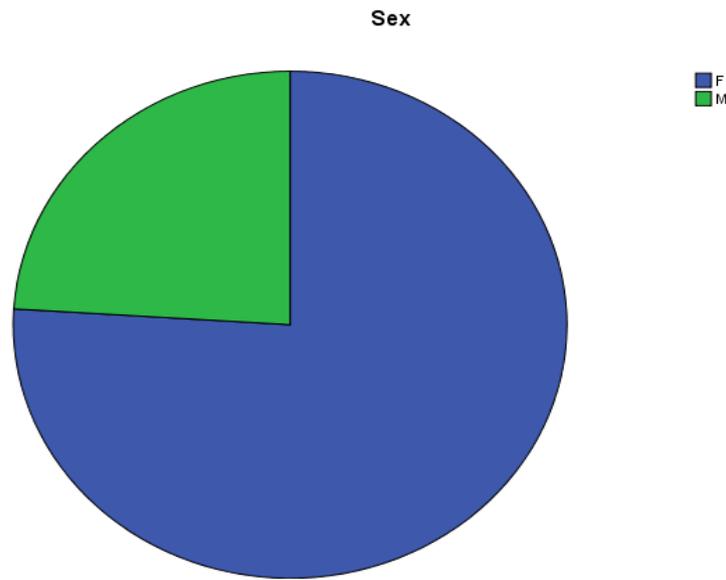


Figure (1): Age distribution

**Sex**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	38	76.0	76.0	76.0
	M	12	24.0	24.0	100.0
	Total	50	100.0	100.0	

**Table (1): Sex Percentage**



**Figure (2): Sex distribution**

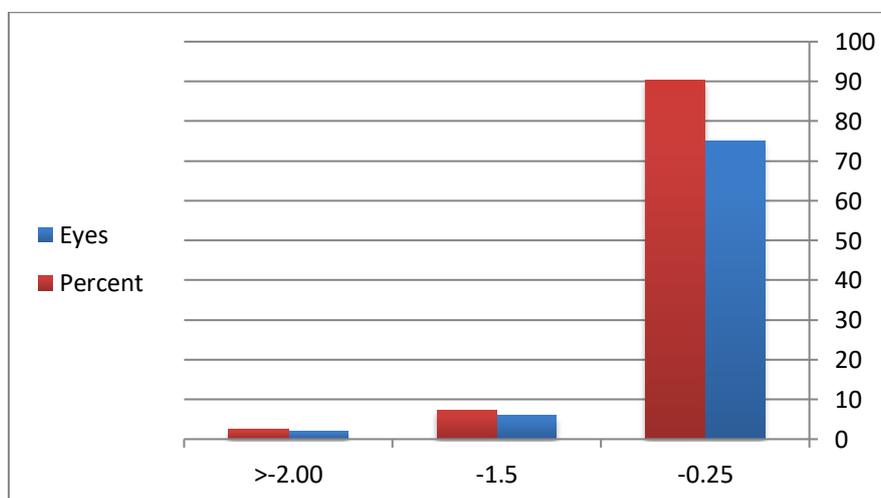
All of the eyes were high-grade myopia with spherical equivalent (-6.00 to -12.00 D)

**Baseline characteristics of study patients (Table.2)**

Characteristics	Mean	Min	Max
Age (y)	32.31	20.00	52.00
Central corneal thickness (µm)	529.14	464	624
Optical zone (mm)	6.67	6.30	7.00
Transitional zone (mm)	1.60	1.00	2.00
Ablation zone (mm)	8.41	7.81	9.00

**Visual acuity, Efficacy and Safety**

At postoperative 12 months follow up , 90.4% of eyes achieved  $\pm 0.25 \pm 1.00$  D target refraction (Figure.3). The Spherical equivalent refraction was  $-0.25 \pm 1.50$  D (Table 3), only two eyes had a residual myopia of -2.00 D.



**Figure (3) : Target refraction postoperative**

After 12-month follow-up, nearly 59% of eyes post TPRK achieved 1.0 UDVA (Figure.4 ), considering that some eyes was already presented with low best CDVA(less than 0.6 ).

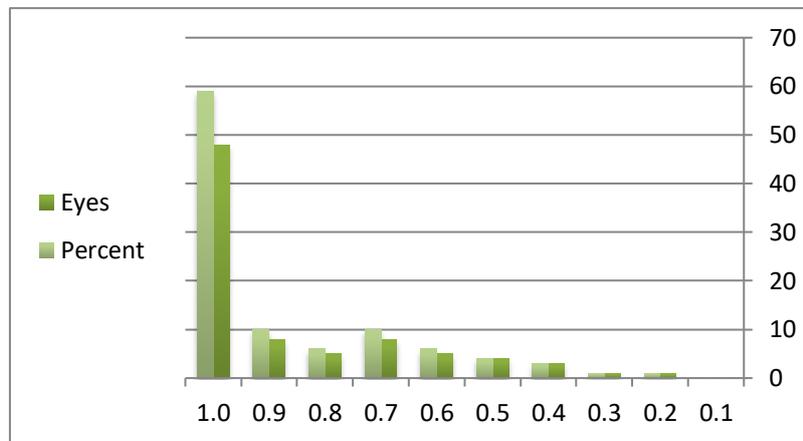


Figure (4) : Achieved visual acuity

The preoperative Central Corneal Thickness (CCT) were not significantly an issue for final target refraction (Figure.5 & 6).

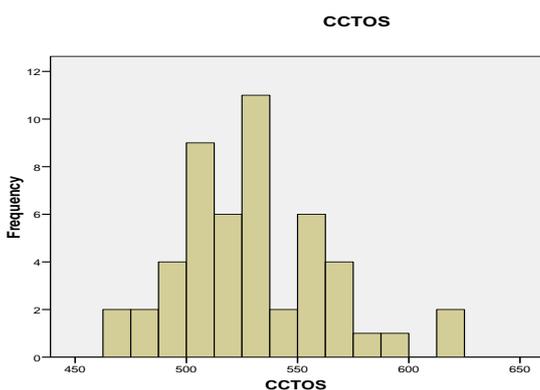


Figure (5)

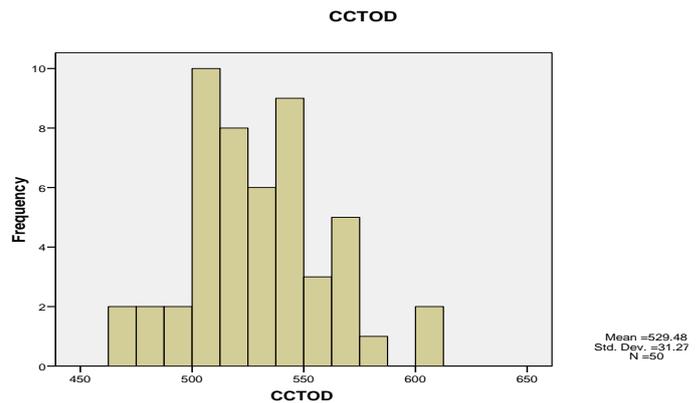


Figure (6)

### Discussion

This study demonstrated that one-step TransPRK could correct high myopia effectively. Twelve months after surgery, there was a significant improvement in UDVA, and SE in the high myopia . More than 90.4% of the treated eyes were within  $\pm 1.00$ D SE of the intended target refraction. Previous clinical studies<sup>3,4,10,11</sup> have reported acceptable visual and refractive outcomes after TransPRK.

Postoperative refraction was never more than  $\pm 1.00$  D in our group , but it was higher than in other study<sup>5</sup>. Only Eight eyes were outside  $\pm 1.00$  D, and were requiring retreatment for their vision but the percentage of retreatment was low (9.6%) in comparable to other PRK study<sup>10</sup>.

At 12 months, refractive status was more minus in our group, with some under correction.

In other study<sup>5</sup>, small overcorrection was also observed in the eyes that had TPRK group. Better UDVA in theTPRK might have occurred because of slight over correction.

For the sake of biomechanical stability, patients with thinner CCT, has no significant difference using TPRK in high myopia

In conclusion, our data shows that TransPRK is a safe and effective surgical option in high myopia. A large sample size and long-term results are needed in future studies.

## Conclusions

Although the main limitations of our study were a relatively short-term follow-up of 12 months . We believe that TransPRK is a safe and effective surgical option in the treatment of high myopia up to -12 SE . A longer follow-up period is necessary for comprehensive evaluation of visual acuity and refraction stability .

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